

Boston Gas Fuels New England

BOSTON GAS CO.

Date Operations Began: 1822

Service Area: The city of Boston and 73 surrounding communities, for a total area of slightly more than 1,000 sq miles.

Number Of Meters: 479,000

Number Of Employees: 1,725

Pipeline Suppliers: Algonquin Gas Transmission Corp. and Tennessee Gas Transmission Corp.

1983 Gas Sales: 83.8 Bcf

1983 Operating Revenues: \$568 million

1983 Net Income: \$37 million

1983 Capital Expenditures: \$12 million

Boston Gas Co., the nation's second oldest gas utility and New England's largest, provides clean burning gas energy to almost half a million customers in 74

towns and cities through a network of more than 5,600 miles of main.

Boston Gas' direct ancestor began operations in 1822, manufacturing coal gas for street illumination. Natural gas was introduced 131 years after gas began lighting Boston's streets.

Natural gas was gradually added to the coal gas beginning in 1953, according to John T. McKenna, senior vice president for operations, before going to 100% natural gas in 1960.

"We took it in a series of stages," McKenna said. "We went from 530 Btu to 610 Btu to 640 Btu, then 800, 900, and finally 1,000 Btu." McKenna said the gradual process was used in the interests of safety.

"Our system was very old at that time," he said. "The lines had been laid by eight different companies, sometimes four or five mains in the same street, plus we had to give our servicemen time enough to convert all the gas burning appliances."

Operating an older system in an urban environment requires strict attention to leak control, corrosion, and safety, said Anthony J. DiGiovanni, vice president for distribution and engineering.

"We have many miles of low pressure distribution lines," DiGiovanni said. "About 75% of our system is low pressure." DiGiovanni said drying out of portions of the low pressure system has been a problem, and in other areas the gas is still oil-fogged to keep a tight seal on the older joints. However, he said, by far the biggest threat to the system is accidental dig-ins by contractors.

In an attempt to ease that problem, Boston Gas began pushing for a state-wide "one-call" accident prevention program in the 1960s. By the early 1970s, the private, non-profit Dig-Safe system was implemented in Massachusetts.

"It's not as effective as it should be but we think it is helping us protect our lines," said McKenna. "Still, about a third of the

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PIPELINE &
GAS JOURNAL

LNG tanks hold pipeline gas liquefied during the summer by Baltimore Gas for use as winter peakshaving.

contractor dig-ins are a result of not notifying the system. It's mandatory, but there are few penalties."

Another safety effort is an intensive gas leak detection program, according to DiGiovanni.

DiGiovanni said more leak-detection surveys are carried out each year than are required by the state and federal codes, with flame ionization detector-equipped trucks being used heavily. Surveys are more frequent in the winter and near major construction projects, he said, and the level of odorant is higher than required so leaks will be more apparent to customers.

In an effort to cut the volume of lost and unaccounted-for gas, Boston Gas has a policy of installing only temperature-compensated meters. At a rate of 25,000

conversions per year, all of Boston Gas' meters should be temperature-compensated by the mid-1990s, McKenna said.

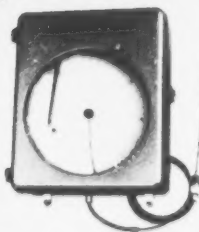
"In addition, we're trying to do a better job of checking the transmission line billings and converting them to Btus," he said. "We use therm billing on all purchases and all sales."

Although Boston Gas' supplies are sufficient to meet the demands of existing customers, there is not much room for expansion, McKenna said. About 83% of the company's gas comes from Gulf Coast fields through Algonquin Gas Transmission Co. and Tennessee Gas Pipeline Co., with the remainder being Algerian LNG



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imported by Distrigas of Massachusetts Corp., and from the company's own SNG and propane facilities.

"We feel we're too dependent upon peakshaving supplies," he said. "We want more basic pipeline supply. There is a large potential market for additional gas here."

McKenna said only about 30% of homes in Boston Gas' service area use gas for heating, and only 54% of the company's residential customers have gas furnaces or heaters. There are currently no hook-up restrictions.

Boston Gas is a member of the Boundary Gas consortium that is seeking to bring additional Canadian gas to the Northeast, and should be receiving the first gas from Boundary in late 1986. By then, McKenna said, the prospect is good that additional supplies also will be available from gas fields off Canada's East Coast.

"We have enough gas to grow on until then," he said. The tight supply has prevented the company from seeking new large customers, he said, which could bring down the price of gas for everyone.

"Our big competitor is oil," he said. "Right now we're about 87-90% the price of oil. We can compete with oil for the interruptible market but not the firm customer if additional capital investment is required. Oil's just too close to the price of natural gas."

The literal bottom line to any company is whether it makes a profit for its investors, and Boston Gas makes the grade in that category. In 1983, pre-tax earnings of \$37.4 million were up a whopping 84% from the \$20.3 million recorded in 1982. Most of the increase is attributed to new rates that were in effect for the full 12 months, but tightly controlled operating costs also played a major part. The current 15.5% allowable rate of return is based entirely on sales to firm customers, the 446,000 residential customers and the 33,000 commercial establishments using natural gas on a continuing basis.

A company also has to be a good citizen, and Boston Gas again makes the grade. Since 1981, the company has been helping low income customers receive fuel assistance from various government agencies. In 1983, Boston Gas processed payments totaling \$10.7 million for 26,000 customers under the program. A new program was developed in 1983 to help social service agencies obtain low interest loans for energy conservation projects.

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Brooklyn Union Copes With Urbanity

BROOKLYN UNION GAS CO.

First Year Of Operations: 1849
(Organized in 1825)

Service Area: The boroughs of Brooklyn, Staten Island, and two-thirds of Queens, all in New York City, an area of approximately 187 sq miles.

Number Of Meters: 1,075 million

Number Of Employees: 3,730

Pipeline Suppliers: Transcontinental Gas Pipe Line Corp.; Texas Eastern Transmission Corp.; and Tennessee Gas Pipeline Co.

1983 Gas Sales: 109 Bcf

1983 Operating Revenues: \$939 million

1983 Net Income: \$49 million

1983 Capital Expenditures: \$60 million

Across the Brooklyn Bridge from Manhattan Island is the borough of Brooklyn, the largest borough in the largest city in

the U.S. It is the home of Brooklyn Union Gas Co., a modern, aggressive utility operating in the most urban of urban environments.

Just look at the evidence. It has increased its heating customers from 267,200 in 1973 to 350,100 in 1983 while the population of the service area was dropping. It is a gas producer in places as far from New York City as West Virginia, through its Fuel Resources Inc. subsidiary, and as close as the Fresh Kills landfill, through its Methane Development Corp.

joint venture with Getty Synthetic Fuels. And unlike many urban gas utilities that have no opportunity for growth and new business inside its service area, Brooklyn Union serves growing suburban communities on Staten Island.

Brooklyn Union's direct ancestor, The Brooklyn Gas Light Co., was chartered in 1825. However, it refunded its stockholders' investment in 1834 before making any gas when it failed to receive a contract for street lighting. Thirteen years later, after Brooklyn had grown to



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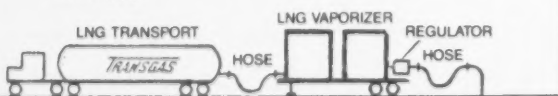
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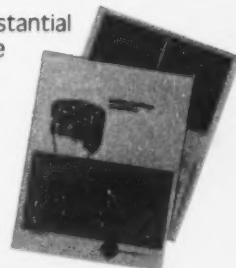


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Computerized mapping helps Brooklyn Union keep track of its facilities in rapidly growing Staten Island.

100,000 and become a chartered city, the gas company was revived. A contract for street lighting was obtained and a gas plant was built near the Brooklyn Navy Yard. The first gas was sent through 6½ miles of main late in 1849.

Brooklyn Union Gas was incorporated Sept. 9, 1895, consolidating many smaller gas companies then serving Queens and Brooklyn. The Staten Island service area came with the acquisition of Richmond Gas Co. in 1957.

A good portion of Brooklyn Union's system is more than 100 years old (although the average service is only 20 years old) and requires tender care, said Edward J. Anderson, director of engineering, distribution department.

"We have an aggressive program of preventive maintenance," he said. "We're inserting 1-in. plastic pipe into our bare steel service lines at the rate of about 10,000 to 11,000 per year and have already noticed a dramatic drop in our service calls."

Anderson said about 20,000 joints a year are sealed in the service area, using metallic and nonmetallic seals and an increasing number of internal joint seals.

"We use the internal joint seal system that allows a crew to seal 28 joints in a day with just two openings in the street," he said. "When they are through, you know that block is free of leaks."

"We feel that if we spend the money today we'll benefit through future savings. Our leak surveys exceed the state code requirements, which are noticeably more stringent than the federal code, hoping to find leaks before they get more severe," Anderson said. "We find about 5,000 leaks per year, and that's on a downward slope now. We've got to keep down the cost of gas to the consumer, and we've found we are able to do that through improved methods and innovative technology that is now coming onto the marketplace."

To ensure the longevity of its system, Brooklyn Union has exacting tests that all new material must meet before it can be installed and used.

"Nothing goes into the field unless and until it passes our tests first," said Anderson. "That covers valves, coatings, anodes — literally anything that is put into our system. We work very closely with many manufacturers so we can be sure items meet our specifications."

The rebuilding of New York City's infrastructure — its streets, its sewers, and its bridges — has been a small blessing and a

big headache for the gas company.

"The good thing is that we are able to replace and upgrade parts of our system, even eliminating double mains in some streets," Anderson said. "The bad thing is that our ratepayers wind up having to pay for work that is not required by the gas company, and which we can't get reimbursed for."

Anderson said utilities in New York City are in a unique position. When the company is forced to relocate gas lines due to street or sewer construction, the company pays all the expense. "We're there (in the street) at their pleasure," Anderson explained.

In 1983, capital expenditures associated with relocations due to government reconstruction work exceeded \$13 million, in addition to \$5 million in maintenance expenses to support and protect gas mains.

"Here in New York we're on the leading edge of the program to rebuild this nation's infrastructure," he said. "That expense is going to do nothing but get higher." The company is pushing for state and local legislation to allow utility reimbursements, Anderson said.

Brooklyn is also undergoing a private sector rebirth known as the "brownstone revolution," Anderson said some neighborhoods become more desirable than others, the shift in population overloads some mains as other mains become under-used. This results in the abandonment of some mains and upgrading of others.

Deciding when to abandon lines and where to upgrade lines used to be a difficult question, but Anderson said a network simulation system developed by Stoner Associates of Carlisle, Pa., has eliminated much of the guesswork involved in that decision.

"I'm an advocate of this approach," Anderson said. "It's saving us a tremendous amount of money. It can tell us in minutes if a main is needed when the temperature drops to 20 F, or if it isn't needed until it goes to 10 F. It is saving us many engineering hours."

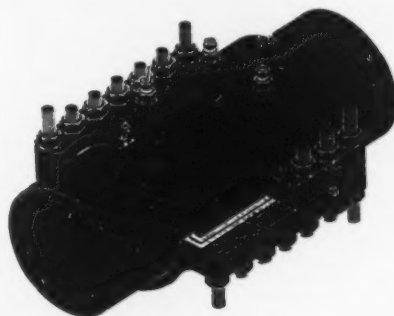
Brooklyn Union is aggressive in promoting gas cleanliness, dependability, and efficiency. New annualized firm load of 3.8 Bcf was added in 1983 despite higher gas costs, helping offset fixed costs through a broader customer base.

Conversions from oil heating totaled 5,100 in 1983, an important segment in the annual load increase. Most of the 1,600 new homes built in the service area



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Washington Gas Light:

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WASHINGTON GAS LIGHT CO.

First Year Of Operations: 1848

Service Area: The metropolitan Washington area, including the District of Columbia and adjacent areas of Maryland and Virginia, for a total of 624 sq miles. Wholly owned subsidiaries Shenandoah Gas Co. and Frederick Gas Co. provide gas service in the Shenandoah Valley area of Virginia and West Virginia and in Frederick County, Md.

Number Of Meters: 575,285

Number Of Employees: 3,388

Pipeline Suppliers: Columbia Gas Transmission Corp. and Transcontinental Gas Pipeline Corp.

1983 Gas Sales: 112 Bcf

1983 Operating Revenues: \$816 million

1983 Net Income: \$31 Million

1983 Capital Expenditures: \$33 million

in 1983 were equipped with gas furnaces, and 400 apartment buildings were converted to gas heat.

More than 85% of the company's gas comes from three pipelines under long term contracts: Transcontinental Gas Pipe Line Corp., Texas Eastern Transmission Corp., and Tennessee Gas Pipeline Co. In addition, the utility received 3 Bcf from its exploration subsidiary in 1983 and 1 Bcf from the Fresh Kills landfill.

Brooklyn Union also receives Algerian LNG imported by Distrigas of Massachusetts. The company has purchased its full contract volume of 13.6 Bcf per year from Distrigas for the past two years.

The company has a current maximum peak-day supply of approximately 969 MMcf to meet an estimated 0 F peak-day demand of 965 MMcf. Total includes LNG and SNG facilities at the Greenpoint Energy Center with capacities respectively of 229 MMcf and 60 MMcf.

The Washington Gas Light Co., the only gas utility in the U.S. created by an act of Congress, is a company with an old name but new ideas. Not only is gas lighting no longer part of its business in any noticeable sense, Washington itself is no longer the major part of its service area.

"The population of the District of Columbia is shrinking and the population of the surrounding Maryland and Virginia suburbs is growing," said Andrew Tarapchak, vice president of distribution. "We operate in a constantly growing area because of the federal government. This area grows at a moderate rate. We don't experience the economic slowdowns that big industrial cities experience."

Washington Gas was incorporated by Act of Congress July 8, 1848. The system was fairly small prior to World War II, but began growing rapidly after 1945.

"We have a fairly young system because before 1945 we experienced limited

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growth, but then it really boomed," said Patrick Clarke, general superintendent of distribution. "Now the District accounts for only about 27% of our therm sales. Maryland has about 43% of our sales, with the remainder in Northern Virginia."

To be successful in the 1980s, a gas utility must offer energy at a price that can compete with other sources. Washington Gas has used several methods to help keep gas competitive in its market place.

With the cost of gas such an important factor in the burner tip price, Washington Gas turned to some unconventional sources. The company was able to save \$7.5 million by purchasing gas directly from independent producers in 1983. Another \$5.9 million was saved by purchasing lower cost "excess gas" from one of its traditional pipeline suppliers. In total, 22% of Washington Gas' 1983 purchases was from such sources.

Computers also are helping cut costs at Washington Gas.

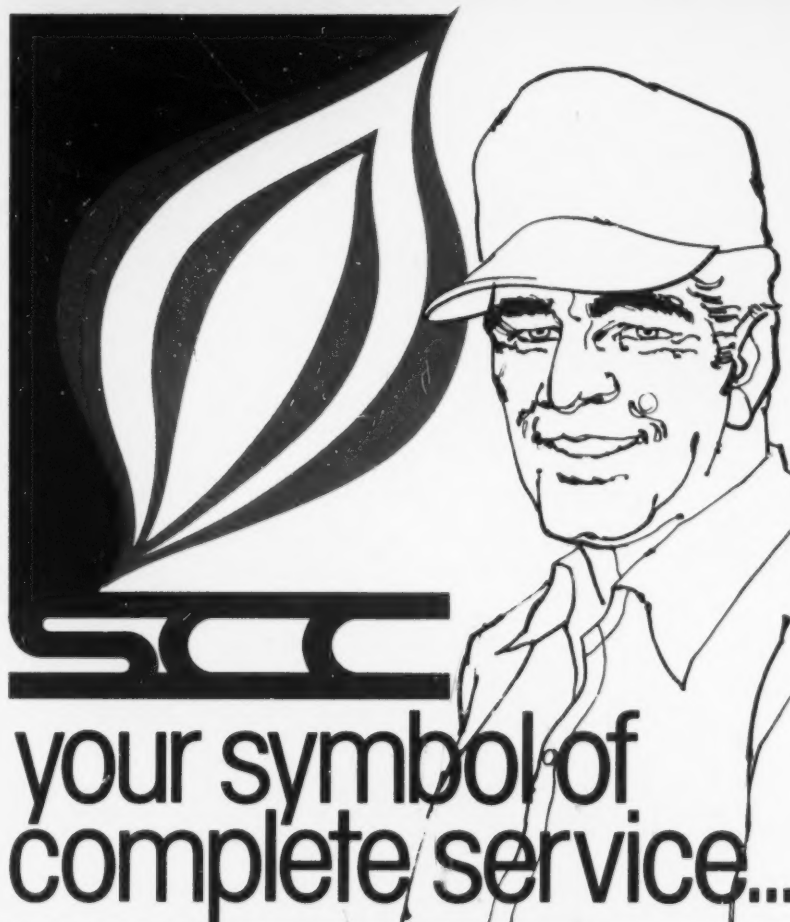
Two new programs were completed in 1983 after several years of work. A plant accounting system speeds up the reporting of property, plant, and equipment, and a jurisdictional accounting system has improved rate-case presentations by providing detailed, accurate data on cost of service in the three jurisdictions where the utility operates.

Two new information systems are to be on-line by late 1984. A new transportation management system will help in the operation, maintenance, and replacement of the vehicle fleet. A paving order system is designed to control paving costs and evaluate the performance of paving contractors.

Computers also are given much credit for reducing the company's operational expenses. E. W. "Ted" Lighton, director of gas control and system planning, said the network simulation computer system developed by Stoner Associates, Carlisle, Pa., helped the utility install 50% more services in 1983 than in 1982 at less than half the cost per service.

About 15% of the company's system is low pressure, practically all of that in the District, Clarke said. More than 200,000 of the existing service lines and 98% of all new services are plastic.

Washington Gas' 1983 construction program included the installation of 7,700 new services, an increase of more than 50% from 1982. The maintenance program in 1983 included renewal of 2,100 existing services and adding cathodic pro-



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tection to another 423 miles of wrapped steel main.

Through most of the 1970s, Washington Gas was operating under a moratorium on new service connections. That has been off for several years, but the effects still are being felt.

"Like many other utilities, we have an electric blanket around some of the areas we serve," said Clarke. "During the 1970s, the homebuilders had to build all-electric homes in some areas because we were forbidden to hook up any new customers. Our biggest competitor here isn't fuel oil, it's the heat pump. We are very concerned about it. We're right on the border of the climate area where the heat pump is practical."

The company's goal is to expand within

a framework of the right mix of customer classes. Some customers are more profitable than others; large commercial and industrial customers provide more revenue and a better rate of return than do single family homes, for example.

The residential market is vital to Washington Gas because of the lack of heavy industrial facilities in the area. Even the concentration of large government office buildings in the District does not help. They are heated by two large central plants, only one of which burns gas, said Tarapchak. Washington Gas' largest customer is the University of Maryland at College Park, which it lost for a year to No. 6 oil before coming up with a rate schedule that brought UM back in 1983.

To increase its share of the residential market, Washington Gas tries to be responsive to builders' needs, Clarke said. "Builders can sell either gas or electric

heating, but they prefer gas," he said. "We try to get into a development early. Home construction has changed completely in the last 10 years. It used to be that the streets were the last thing to go in, now they are the first."

In order to prevent the financial loss of having pipe in the ground months or years before customers are hooked up and revenues generated, Washington Gas keeps a close eye on construction schedules in a development and uses a construction method known as "sleeving."

While the development is still an open field, corrugated polyethylene pipe is installed below areas to be paved. Then, when the heavy machines have left, mains up to 6-in. and services are pulled through the pipe. Tarapchak said this prevents damage to installed facilities and cuts paving costs.

It's company policy to finance construction for new business through internally generated funds, without relying on bonds or loans. Company crews are used for maintenance and special projects, such as regulator stations, with contractors hired for major new construction projects.

"If we get caught short, then we'll use company crews for construction," said Clarke. "That helps us, since it gives us a cost comparison with contractor crews. We've been working with our contractors, trying to stabilize the workload so they aren't faced with laying crews off one month and trying to hire them back the next. So far, it's working."

A "one-cell" system known as "Miss Utility" is proving beneficial for Washington Gas. In 1983 alone, the system received 60,000 calls for digging in Washington Gas' service area.

"It's having a very noticeable effect," said Tarapchak. "Before it went into effect we would have 2,000 damages a year in a much smaller service area. Now it is down to about 800. If we have repeat offenders, we aren't reluctant to take them to court."

About half of the \$33.2 million in capital expenditures in 1983 was for new business. Another 24% went for replacing distribution facilities, and 6% was spent on gas exploration and development through its Crab Run Gas Co. and Hampshire Gas Co. subsidiaries. Capital expenditures for 1984 are set at \$45.5 million, almost half of which is earmarked for new business and 21% for replacement of distribution facilities.

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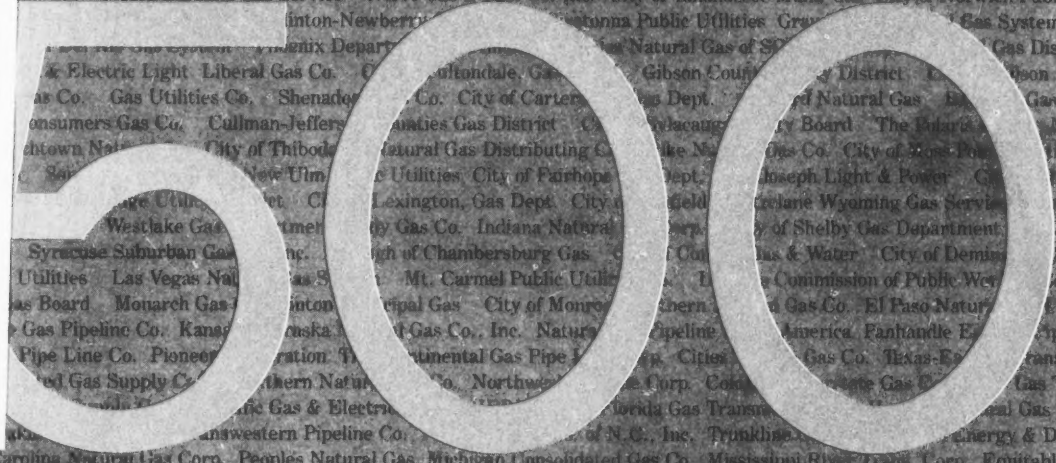
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Details On The 500 Leading Companies Transporting Energy Through Pipelines

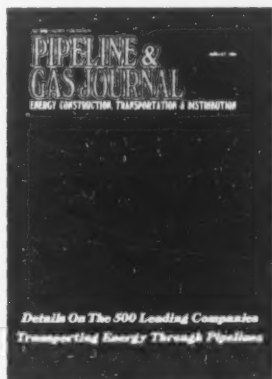
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International Pipeline & Gas Utility Design, Construction & Operation

P&GJ's Presentation Editor James Duke and Graphics Director Don Fickert see the P&GJ 500 Report as more than just a collection of data; it has graphic ramifications, too, and this issue's cover reflects their latest findings in the mass of information that even artists and art directors have to examine for ideas.



ON THE COVER:

P&GJ's 4th 500 Report conveys some interesting information about the pipeline energy business, which comprises 1,560 gas utilities, 500 gas gathering and transmission companies, and 500 liquids pipeline companies in the U.S. From this vast number, P&GJ has selected the top 300 gas utilities, 100 gas pipelines, and 100 liquids pipelines. These 500 represent 97% of all gas customers, 96% of all gas mains and services, 86% of all gas pipelines, and 61% of all oil pipelines.



IN THIS ISSUE

Bar code labels for gas meters, handheld microprocessors for reading gas meters; a fantastic material that makes wet backfill turn solid; nylon tubing for mains and services; devices to check for flaws in plastic pipe fusion joints; a roundup of internal pipe renovation methods — these are among the features of September's P&GJ report on Distribution Technology.



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Dual 20-in. crude and products line in west central India had to be uncovered by hand so pipe could be cleaned and recoated.

46 Computerized Records

Lone Star Gas Company is converting its 1.2 million customer records from microfiche to computers; CRTs will provide instant access.

- 50 People**
Action makers on the move
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Dimensions Of 500 Leading Energy Pipeline Companies THE 4th P&GJ 500

The companies surveyed in the 4th edition of PIPELINE & GAS JOURNAL's 500 Report supply energy to millions of Americans through one of the safest, most efficient transportation modes yet devised — the underground pipeline network.

This network stretches into every state of the union, collecting hydrocarbon energy at the wellhead and transporting it through various stages to the ultimate consumer. That consumer might be a steel mill or a suburban home or the local gasoline jobber — anything or anybody that requires energy.

There are approximately 1,560 gas utilities, 500 gas gathering and transmission

by **DENISE LUTTRALL**,

Editorial Assistant;

JIM WATTS,

Assistant Editor,

and **DEAN HALE**,

Editor

companies, and 500 liquids pipelines in the U.S. The 4th P&GJ 500 surveys and lists the vital statistics for almost 20% of all the energy pipeline companies in the U.S. These 500 companies account for 97% of the gas customers, 96% of the gas distribution mileage, 86% of the long distance gas transmission mileage, and

61% of the liquids (crude oil and refined products) mileage.

These companies hold billions of dollars worth of assets and spend billions in keeping their physical facilities in top operating condition. They are the giants, middle sized companies, and small companies. They are municipally owned, investor owned, and privately owned. They are varied, they are vital, and they provide the energy that we all need to live our modern lives.

The 300 leading gas utilities range from Southern California Gas Co. with its 3.9 million customers to Decatur Utilities with its 4,054 customers. Of the total gas

The 10 Biggest Spenders — Gas Transmission and Gathering Pipelines

Rank	83	84	Company Name	1983 Additions To Plant, \$(000)
7	1		Texas Oil & Gas Corp.	480,330
	2		United Gas Pipe Line Co.	331,827
1	3		Transcontinental Gas Pipe Line	147,330
9	4		Natural Gas Pipeline Co. of America	114,907
4	5		Tennessee Gas Pipeline Co.	114,648
	6		Northwest Pipeline Corp.	97,000
	7		United Texas Transmission Co.	66,490
5	8		Texas Eastern Gas Pipeline Co.	59,648
10	9		Southern Natural Gas Co.	47,383
	10		ANR Pipeline Co.	44,828

(not including integrated companies)

The Top 10 In Revenues — Gas Transmission and Gathering Pipelines

Rank	83	84	Company Name	1983 Revenues \$(000)
1	1		El Paso Natural Gas Co.	4,122,887
3	2		Columbia Gas Transmission Co.	3,860,155
2	3		Tennessee Gas Pipeline Co.	3,645,817
4	4		Transcontinental Gas Pipe Line	3,616,141
7	5		Texas Eastern Gas Pipeline Co.	3,146,927
8	6		Natural Gas Pipeline Co. of America	3,010,990
10	7		Northern Natural Gas Co.	2,673,229
6	8		United Gas Pipe Line Co.	2,645,257
	9		ANR Pipeline Co.	2,636,800
	10		Consolidated Gas Supply Corp.	2,374,965

The Top 10 Gas Transmission and Gathering Pipelines In MMcf Gas Sales

Rank	83	84	Company Name	1983 Sales MMcf
8	1		Texas Eastern Gas Pipeline Co.	967,437
2	2		Natural Gas Pipeline Co. of America	921,206
5	3		El Paso Natural Gas Co.	876,000
1	4		Tennessee Gas Pipeline Co.	863,862
6	5		Transcontinental Gas Pipe Line	823,025
7	6		Columbia Gas Transmission Co.	771,043
	7		Columbia Gulf Transmission Co.	675,091
	8		Trunkline Gas Co.	605,716
10	9		Northern Natural Gas Co.	589,721
3	10		United Gas Pipe Line Co.	586,476

The 10 Biggest Spenders — Gas Distribution Utilities

Rank	83	84	Company Name	1983 Additions To Plant, \$(000)
3	1		Public Service Electric & Gas Co.	77,013
5	2		Northern Illinois Gas Co.	64,248
7	3		Brooklyn Union Gas Co.	57,974
	4		Montana-Dakota Utilities Co.	56,830
	5		Atlanta Gas Light Co.	56,604
10	6		Peoples Gas Light & Coke Co., The	48,520
	7		Entex Inc.	46,910
	8		Michigan Consolidated Gas Co.	45,623
	9		Public Service Co. of Colorado	43,427
	10		Northern Indiana Public Service	43,224

(not including integrated companies)

The Top 10 In Revenues — Gas Distribution Utilities

Rank	83	84	Company Name	1983 Revenues \$(000)
1	1		Southern California Gas Co.	4,499,508
3	2		Pacific Gas & Electric Co.	3,369,456
4	3		Columbia Gas Distribution Co.'s	2,862,849
8	4		Michigan Consolidated Gas Co.	1,952,466
7	5		Consolidated Gas Distribution Co.'s	1,935,563
6	6		Northern Illinois Gas Co.	1,921,766
5	7		Lone Star Gas Co.	1,840,131
	8		Consumers Power Co.	1,399,896
2	9		Public Service Electric & Gas Co.	1,392,475
10	10		Peoples Gas Light & Coke Co., The	1,341,244

The Top 10 Gas Distribution Utilities In Miles of Mains

Rank	83	84	Company Name	Miles Of Mains
1	1		Southern California Gas Co.	35,686
3	2		Pacific Gas & Electric Co.	30,346
2	3		Columbia Gas Distribution Co.'s	30,181
6	4		Consolidated Gas Distribution Co.'s	28,075
4	5		Northern Illinois Gas Co.	23,785
5	6		Entex Inc.	22,278
7	7		Lone Star Gas Co.	20,073
8	8		Consumers Power Co.	19,467
10	9		Atlanta Gas Light Co.	18,164
	10		Arkla Inc.	15,579

distribution piping in the U.S., estimated at 1.4 million miles of mains and services, the top 300 utilities account for more than 1.3 million miles. The top 10 gas utilities alone serve more than 17.8 million customers and operate 227,000 miles of mains and 174,000 miles of service lines. Sales of the top 10 totaled 3.8 Tcf, down 13% from 4.3 Tcf in 1982.

The top 10 gas pipelines sold 6.3 Tcf in 1983 and had revenues totaling \$27.97 billion, compared to 1982 sales of 7.4 Tcf with identical revenues. The top 10 gas pipelines operated 148,915 miles of gathering and transmission lines as of Dec. 31, 1983, compared to 147,426 miles at

the end of 1982, an increase of 1,489 miles. Texas Eastern Gas Pipeline was first in gas sales in 1983, with 967 Bcf, compared to eighth in 1982 with sales of 885 Bcf. Texas Oil & Gas was first in additions to plant, with \$480 million in capital expenditures. El Paso Natural Gas was first in revenues among the gas pipelines for the fourth year in a row with revenues of \$4.122 billion.

The top 10 liquids pipeline companies delivered 4.8 billion bbl of crude and refined products out of their systems in 1983, compared to 4.7 billion bbl in 1982. The top 10 products pipelines delivered 2.3 billion bbl of refined products and the

top 10 crude oil lines carried 3.5 billion bbl.

The following tables provide an overview of the Top 10 companies in several categories; the complete tabular presentation gives a more complete overview of the 500 companies in the three categories.

PIPELINE & GAS JOURNAL assumes no responsibility for incomplete, non-current, or missing information for companies listed below who did not return the survey forms in a timely fashion, or for companies that might qualify but are not listed because they did not complete a survey form.

The 10 Biggest Spenders – Liquids Pipeline Companies

Rank		Company Name	1983 Additions To Plant, \$(000)
83	84		
8	1	Williams Pipe Line Co.	66,859
–	2	Texas Eastern Prod. Pipeline Co.	34,285
4	3	Loop Inc.	28,151
10	4	Exxon Pipeline Co.	24,182
7	5	Arco Pipe Line Co.	19,352
–	6	Amoco Pipeline Co.	16,264
–	7	American Petrofina Pipe Line	13,622
–	8	Gulf Pipeline Co.	12,796
–	9	Texas Pipe Line Co.	12,676
9	10	Sohio Pipe Line Co.	9,917

The Top 10 Liquids Pipelines – Revenues

Rank		Company Name	1983 Revenues \$(000)
83	84		
1	1	Sohio Pipe Line Co.	1,251,854
2	2	Arco Pipe Line Co.	895,332
3	3	Exxon Pipeline Co.	890,345
4	4	BP Pipeline Inc.	546,758
5	5	Colonial Pipeline Co.	475,395
6	6	Amoco Pipeline Co.	197,853
7	7	Lakehead Pipe Line Co.	188,713
8	8	Mobil Pipe Line Co.	155,184
9	9	Mobil Alaska Pipeline Co.	153,459
10	10	Shell Pipe Line Corp.	144,649

The Top 10 Liquids Pipeline Companies – In Mileage

Rank		Company Name	Total Miles Of Pipeline
83	84		
1	1	Amoco Pipeline Co.	12,272
2	2	Mobil Pipe Line Co.	11,150
3	3	Exxon Pipeline Co.	9,096
5	4	Williams Pipe Line Co.	8,447
6	5	Mid-America Pipeline Co.	8,233
4	6	Arco Pipe Line Co.	8,037
7	7	Continental Pipe Line Co.	7,370
8	8	Shell Pipe Line Corp.	7,076
9	9	Phillips Pipe Line Co.	5,615
10	10	Colonial Pipeline Co.	5,248

The Top 10 Products Pipeline Companies

Rank		Company Name	1983 Deliveries (000) Bbl Products
83	84		
1	1	Colonial Pipeline Co.	586,174
2	2	Buckeye Pipe Line Co.	253,837
3	3	Southern Pacific Pipe Line Co.	243,355
4	4	Gulf Pipeline Co.	197,257
–	5	Marathon Pipe Line Co.	194,983
5	6	Phillips Pipe Line Co.	181,091
6	7	Williams Pipe Line Co.	168,410
7	8	Plantation Pipe Line Co.	162,303
9	9	Arco Pipe Line Co.	152,398
–	10	Mid-America Pipeline Co.	138,414

The Top 10 Gas Distribution Utilities In MMcf Sales

Rank		Company Name	1983 Sales MMcf
83	84		
1	1	Southern California Gas Co.	796,127
2	2	Pacific Gas & Electric Co.	604,026
3	3	Columbia Gas Distribution Co.'s	467,229
5	4	Northern Illinois Gas Co.	411,607
6	5	Consolidated Gas Distribution Co.'s	391,976
4	6	Lone Star Gas Co.	380,652
7	7	Michigan Consolidated Gas Co.	359,091
10	8	Consumers Power Co.	273,243
8	9	Arkla Inc.	263,818
–	10	Oklahoma Natural Gas Div. (ONEOK)	251,301

The Top 10 Crude Pipelines

Rank		Company Name	1983 Deliveries (000) Bbl Crude
83	84		
1	1	Arco Pipe Line Co.	503,252
2	2	Exxon Pipeline Co.	457,016
3	3	Lakehead Pipe Line Co.	404,233
4	4	Shell Pipe Line Corp.	372,956
–	5	Marathon Pipe Line Co.	348,658
5	6	Amoco Pipeline Co.	322,830
6	7	Sohio Pipe Line Co.	303,501
9	8	Texas Pipe Line Co.	286,263
7	9	Gulf Pipeline Co.	253,956
8	10	Mobil Pipe Line Co.	199,998

The 300 Leading Gas Distribution Utilities

The P&GJ 500... dimensions of the pipeline energy business

Rank 83	Rank 84	Name Of Company	Number Of Customers	1983 Gas Sales, MMcf	1983 Oper. Revenues \$(000)	1983 Net Income \$(000)	Gas Plant Value \$(000) 12-31-83	Additions To Plant \$(000)	Miles Of Mains	Miles Of Services
1	1	Southern California Gas Co.	3,941,180	796,127	4,499,508	110,024	1,388,665	178,091	35,686	36,951
2	2	Pacific Gas & Electric Co.	2,948,943	604,026	3,369,456	198,274	2,041,806	67,731	30,346	23,797 ^B
3	3	Columbia Gas Distribution Co.'s	1,901,451	467,229	2,862,849	233,512	1,087,253	70,196	30,181	21,608
4	4	Consolidated Gas Distribution Co.'s	1,490,152	391,976	1,935,563	56,155	843,896	52,445	28,075	28,223
5	5	Northern Illinois Gas Co.	1,470,341	411,607	1,921,766	88,429	1,164,453	64,248	23,785	19,433
6	6	Public Service Electric & Gas Co.	1,330,411	201,504	1,392,475	389,779 ^A	695,718	77,013	12,752	12,587
7	7	Entex Inc. ^F	1,236,514	205,086	1,143,988	42,760	327,836	46,910	22,278	13,149
8	8	Lone Star Gas Co.	1,198,867	380,652	1,840,131	68,621	965,510	61,559	20,073	2,678
9	9	Consumers Power Co.	1,180,713	273,243	1,399,896	70,554	1,307,725	37,029	19,467	11,019 ^D
10	10	Brooklyn Union Gas Co. ^I	1,068,827	96,879	909,639	41,047	760,536	57,974	3,834	5,243
11	11	Michigan Consolidated Gas Co.	1,045,168	359,091	1,952,466	31,331	818,740	45,623	12,831	13,895
12	12	Consolidated Edison Co. of N.Y. Inc.	1,016,146	98,551	60,000	492,551 ^A	562,056	48,098	4,191	2,594
74	13	Kansas Power & Light Co., The	975,521	125,734	451,639	83,604 ^A	1,380,887 ^C	13,950	N A	N A
14	14	Atlanta Gas Light Co. ^F	874,264	220,102	1,113,714	18,020	628,406	56,604	18,164	15,420
13	15	Peoples Gas Light & Coke Co., The ^F	864,049	251,006	1,341,244	33,396	730,857	48,520	3,995	5,111
15	16	Gas Service Co., The ^H	853,385	178,209	873,137	11,419	418,540	18,085	13,109	5,783
17	17	Public Service Co. of Colorado	744,348	177,585	761,629	106,379 ^A	394,047	43,427	10,854	6,554
16	18	Arkla Inc.	718,567	263,818	1,036,412	59,123	1,117,978	60,113	15,579	7,477
18	19	National Fuel Gas Distr. Corp. ^I	673,302	156,422	1,011,291	30,193	692,232	58,267	12,914	11,437
19	20	Oklahoma Natural Gas Div. (ONEOK)	648,375	251,301	964,330	31,883	472,951	32,001	10,829	7,299

The 15 Largest Integrated Gas Utilities

Rank 83	Rank 84	Name of Company	No. of Customers	MMcf Sales	Miles of Mains	Miles of Trans. Lines	Additions To Plant \$(000), 1983
-	1	Pacific Lighting Corp.	3,941,182	793,917	35,687	3,301	249,956
1	2	Pacific Gas & Electric Co.	2,948,943	595,910	30,195	5,137	89,854
-	3	Columbia Gas System	1,901,537	876,299	30,181	24,000	138,492
-	4	Consolidated Natural Gas Co.	1,490,212	673,315	28,075	8,205	313,862
2	5	Lone Star Gas Co., Div. of Enserch	1,198,867	380,652	20,023	10,767	61,559
3	6	Consumers Power Co.	1,180,713	276,088	18,414	1,296	37,644
4	7	Michigan Consolidated Gas Co.	1,065,701	359,100	12,831	2,384	47,581
5	8	Arkla, Inc.	718,622	265,849	15,799	9,583	72,600
6	9	National Fuel Gas Co.	673,294	161,280	12,914	4,513	68,274
-	10	Southern Union Co.	658,000	123,297	12,808	2,527	32,864
7	11	Oklahoma Natural Gas Co. (ONEOK, Inc.)	648,332	278,074	10,829	4,624	37,408
8	12	Mountain Fuel Supply Co.	423,146	127,573	7,192	2,351	107,432
9	13	Southwest Gas Corp.	363,448	67,686	6,783	1,460	19,633
-	14	InterNorth, Inc. (Northern Natural; Peoples Nat. Gas. Divs.)	305,823	589,721	5,207	27,799	43,941
-	15	Equitable Gas Co.	259,701	69,699	3,372	5,114	21,864

A Includes electric
B Gross utility plant
C Total utility plant
D Formerly Haverhill Gas Co.
E Estimated
F Fiscal year ended 6-30-83
G FY ended 7-31-83
H FY ended 8-31-83
I FY ended 9-30-83
J FY ended 10-31-83
K FY ended 11-31-83
L FY ended 3-31-84
M For 9 months ended 9-30-83
N FY ended 6-30-83 for income, plant value, and additions only
O Acquired by Kansas Power & Light, 10-83
P Includes Manchester Gas and Gas Service of N.H.
Q Owns part of the Trans-Alaska Oil Pipeline
R Now includes Amdel Pipeline and Cosden Pipe Line

The Top 10 Combination Gas & Electric Utilities — By Gas Customers

Rank 83	Rank 84	Company Name	No. of Customers	1983 MMcf Sales	Miles of Mains
1	1	Pacific Gas & Electric Co.	2,948,943	604,026	30,346
2	2	Public Service Electric & Gas Co.	1,330,411	201,504	12,752
3	3	Consumers Power Co.	1,180,713	273,243	19,467
4	4	Consolidated Edison Co. of N.Y.	1,016,146	98,551	4,191
5	5	Public Service Co. of Colo.	744,348	177,585	10,854
6	6	Northern Indiana Public Serv. Co.	532,406	233,425	9,436
7	7	San Diego Gas & Electric Co.	530,256	42,859	5,204
8	8	Baltimore Gas & Electric Co.	513,970	86,186	4,257
9	9	Niagara Mohawk Power Co.	430,820	103,153	5,968
10	10	Long Island Lighting Co.	400,443	47,566	5,900

The P&GJ 500...dimensions of the pipeline energy business

Rank 83	84	Name Of Company	Number Of Customers	1983 Gas Sales MMcf	1983 Oper. Revenues \$(000)	1983 Net Income \$(000)	Gas Plant Value \$(000) 12-31-83	Additions To Plant \$(000)	Miles Of Main	Miles Of Services
21	21	Washington Gas Light Co.	575,285	114,125	815,666	30,575	495,421	33,151	6,767	8,033
20	22	Minnegasco Inc.	572,440	138,845	742,588	23,245	239,658	18,493	8,185	5,503
22	23	Laclede Gas Co. ¹	539,267	102,740	650,803	17,200	248,626	16,895	6,124	5,804
24	24	Northern Indiana Public Service	532,406	233,425	1,021,781	137,849 ^A	691,674 ^B	43,224	9,436	10,039
25	25	San Diego Gas & Electric Co.	530,256	42,859	323,100	22,296	176,832	17,553	5,204	4,199
23	26	Philadelphia Gas Works ^H	518,000	72,537	502,305	23,857	407,358	29,180	2,989	5,016
26	27	Baltimore Gas & Electric Co.	513,970	86,186	545,295	216,453	332,059	20,467	4,257	4,324
27	28	Boston Gas Co.	480,098	83,810	568,161	20,244	230,733	11,698	5,665	4,188
28	29	Niagara Mohawk Power Corp.	430,820	103,153	608,587	312,409 ^A	429,133	37,444	5,968	4,027
29	30	Mountain Fuel Supply Co.	423,146	111,233	567,007	55,683	714,466	107,432	7,192	5,024
30	31	Wisconsin Gas Co.	411,070	112,836	635,344	17,274	214,689	17,197	6,014	4,658
31	32	Long Island Lighting Co.	400,443	47,566	349,726	28,950	360,174	19,037	5,900	4,261
32	33	Illinois Power Co.	382,476	86,667	1,278,259 ^A	210,800 ^A	366,651	15,251	7,238	5,073
34	34	Southwest Gas Corp.	363,451	64,014	384,860	16,651	256,639	20,133	6,784	3,924
33	35	Southern Union Gas Co.	362,000	53,000	208,461	8,040	138,500 ^F	15,260	6,411	2,814
35	36	Alabama Gas Corp. ¹	353,945	75,338	391,435	6,235	116,548	8,903	6,142	7,004
36	37	Arizona Public Service Co.	337,665	36,339	202,134	264,797	4,033,400 ^C	N A	6,180	3,904
37	38	Indiana Gas Co. Inc.	304,799	73,381	416,072	14,193	241,180	21,239	6,639	4,814
39	39	Peoples Natural Gas Div., InterNorth	303,594	123,359	553,934	9,558	135,762	12,642	5,208	3,308
40	40	Philadelphia Electric Co.	301,754	64,864	417,042	26,725	332,074	21,297	4,493	3,128
38	41	Cincinnati Gas & Electric Co., The	301,517	70,080	421,984	145,876 ^A	133,931	10,337	3,478	805
42	42	Gas Co. of New Mexico	298,320	67,125	343,238	8,248	200,911	13,035	6,364	1,518
41	43	Northern States Power Co.	292,300	71,850	399,754	N A	279,088	10,775	4,481	3,134
43	44	Energas (Pioneer Corp.) ¹	286,329	82,726	302,259	4,097	45,100	5,057	10,753	624
44	45	San Antonio City Public Service	274,739	26,653	140,049	2,525	158,979	6,296	3,485	3,023
45	46	Dayton Power & Light Co.	263,766	48,257	288,780	N A	127,376	4,456	3,899	741
46	47	Equitable Gas Co.	259,701	69,699	362,200	15,300	217,778	25,953	3,372	2,453 ^F
47	48	Washington Natural Gas Co. ¹	253,803	51,696	334,629	8,933	242,052	23,791	6,085	6,151
48	49	Northwest Natural Gas Co.	249,851	59,685	360,574	17,207	307,265	24,721	7,669	4,718
49	50	New Jersey Natural Gas Co. ¹	244,474	49,271	279,117	8,105	154,979	18,602	4,058	3,933
52	51	Memphis Light, Gas & Water	234,539	57,860	267,766	14,236	94,435	5,559	926	2,321
53	52	Rochester Gas & Electric Corp.	233,284	42,881	756,061 ^A	86,248 ^A	212,521	9,981	3,580	2,829
51	53	Louisville Gas & Electric Co.	233,088	48,276	230,597	59,698	91,771	4,819	850	2,854
50	54	Louisiana Gas Service Co. ¹	232,312	19,798	141,459	1,805	73,863	8,763	3,751	2,316
54	55	Iowa-Illinois Gas & Electric Co.	224,939	62,795	281,800	59,522	109,759	3,984	3,655	2,610
55	56	Bay State Gas Co.	223,709	43,231	307,223	6,976	188,402	13,268	2,310 ^F	2,083
62	57	K N Energy Inc.	223,487	112,227	465,706	22,828	506,465	27,971	3,746	2,789
56	58	Wisconsin Natural Gas Co.	221,199	62,019	341,434	10,969	157,880	16,817	4,277	2,875
59	59	Mississippi Valley Gas Co.	219,180	49,168	232,110	4,864	51,747	4,734	3,852	3,126
57	60	Citizens Gas & Coke Utility	214,405	45,556	268,779	11,406	233,794	10,543	2,989	3,667
60	61	Piedmont Natural Gas Co. ^d	206,605	60,030	346,503	11,868	173,117	15,830	5,422	1,898
58	62	UGI Corp.	206,060	55,820	376,741	27,467	215,852	13,194	3,268	1,987
61	63	Commonwealth Gas Co.	201,619	39,286	261,206	10,929	106,320	7,552	2,377	1,598
63	64	Elizabethtown Gas Co.	197,316	43,523	272,403	11,692	113,716	10,694	2,160	4,692
64	65	South Carolina Electric & Gas Co.	187,638	65,892	337,282	103,938 ^A	137,647	14,410	5,793	4,637
65	66	Central Illinois Light Co.	183,234	39,564	525,857 ^A	44,679 ^A	211,008	9,429	3,210	2,797
67	67	Montana-Dakota Utilities Co.	177,246	45,307	218,956	35,997	207,564	56,830	3,293	2,612
66	68	New Orleans Public Service Inc.	173,045	22,453	136,352	-1,764	47,525	2,872	1,473	3,591 ^E
68	69	Peoples Gas System Inc., Tampa	169,376	41,881	189,711	6,070	151,740	9,465	4,251	2,664
69	70	Public Service of N.C. Inc.	160,059	43,808	247,317	8,254	140,051	15,237	3,649	1,500

ON THE FAST TRACK...

Diversified Energies Inc.: Outlook Is Bright

"Minnegasco Cares" is the theme of all communication and customer contact programs of the major company in Diversified Energies Inc.'s five-company empire. Minnegasco Inc. does care, and the results are impressive. Minnegasco again has received an "AA" rating from Standard & Poors Corp. and Moody's Investors Service — one of only three gas distribution companies in the U.S. with such a rating.

Minnegasco, serving 573,000 customers in 224 communities in three states, accounts for about 96% of DEI's total revenues. Sales to industrial and commercial customers represent about 48% of the company's total 1983 gas sales. Thanks to substantial improvement in non-regulated appliance sales and repair service businesses, Minnegasco's net income was up 9%, even though gas sales were down.

Minnegasco intends to keep moving ahead. A 15-year strategic plan is now in effect, providing a foundation for annual tactical planning to advance the utility toward its stated mission, objectives, and strategies. Credit for the plan lies with Albert D. Etchelecu, president and CEO,

who also is president and CEO of Diversified Energies Inc.

DEI's other businesses include oil and gas development drilling, oilfield services, energy management, and land development through four wholly-owned companies.

DEI Oil & Gas, Inc. is involved in a 50-50 joint venture (\$36 million in 1984) with Cenergy Exploration Co. of Dallas. It has interests in 43 wells, with 19 of them producers, six being completed, seven being drilled, and 11 plugged and abandoned. Most recently, DEI Oil & Gas entered a 50-50 joint venture (\$20 to \$25 million in 1984) with Petrus (H. Ross Perot's firm) to drill for and produce oil and gas.

Major oilfield services are provided by Cal Dive, a diving and subseas services firm to the oil and gas industry with offices in Texas, Louisiana, and California and operations worldwide.

Minneapolis Energy Center Inc., manages downtown Minneapolis district heating and cooling systems, providing steam for heating and chilled water for cooling by pipeline to some 60 commercial customers.

The Preserve, 15 miles from downtown, has only 100 acres (of 1,200) left to sell in a planned environmental concept. The project began in 1972.

Albert D. Etchelecu, left, president and chief executive officer, and Paul W. Kraemer, chairman of the board, Diversified Energies, Inc.

The P&GJ 500... dimensions of the pipeline energy business

Rank 83	Rank 84	Name Of Company	Number Of Customers	1983 Gas Sales, MMcf	1983 Oper. Revenues (\$000)	1983 Net Income (\$000)	Gas Plant Value (\$000) 12-31-83	Additions To Plant (\$000)	Miles Of Mains	Miles Of Services
76	71	South Jersey Gas Co.	157,712	37,840	240,833	8,112	168,041	13,680	3,393	2,358
72	72	Central Illinois Public Service Co.	155,248	33,899	180,066	85,466 ^A	131,826 ^B	5,000	1,327	2,597
71	73	Northeast Utilities	154,808	27,661	238,999	11,643	240,811	19,553	2,337	1,160
70	74	Wisconsin Public Service Corp.	154,755	45,345	629,891	51,594	117,309	6,203	2,785	2,076
73	75	Western Kentucky Gas Co.	139,024	36,281	166,646	2,613	49,387	4,035	2,872	887
77	76	Southern Connecticut Gas Co., The	136,115	20,157	163,655	7,382	111,401	8,208	1,800	1,296 ^C
75	77	Iowa Gas Co.	133,500	31,887	170,902	4,774	64,779	3,937	2,025	2,057
78	78	Iowa Electric Light & Power Co.	132,587	34,112	444,713 ^A	27,898 ^A	67,173	3,145	2,140	1,988
80	79	Metropolitan Util. District, Omaha	131,866	31,764	155,704	2,571	69,671	3,238	1,713	1,974
79	80	New York State Electric & Gas Corp.	130,353	33,524	207,866	156,680 ^A	97,299	5,103	3,877	1,462
86	81	United Cities Gas Co.	128,032	24,461	127,985	1,948	86,101	5,753	2,387	2,066
81	82	Long Beach Gas Dept.	126,780	29,353	146,049	16,847	54,504	2,122	896	1,654
82	83	Connecticut Natural Gas Co.	126,128	24,606	183,010	6,756	139,609	11,154	1,595	1,394
84	84	Iowa Public Service Co.	124,761	35,216	388,090 ^A	39,296 ^A	77,800	2,670	1,897	1,705
83	85	Virginia Natural Gas Div. (VEPCO)	122,237	19,013	123,933	N A	65,180	6,238	2,151	2,315
85	86	Providence Gas Co. ¹	122,155	20,528	155,607	3,930	68,326	6,396	1,714	1,211
87	87	Pennsylvania Gas & Water Co.	113,223	32,014	194,230	10,203	142,935	5,565	1,939	708 ^E
88	88	Michigan Energy Resources Co.	106,330	31,496	165,884	3,937	118,731	5,601	2,585	2,361
89	89	Wisconsin Power & Light	104,838	25,241	145,663	54,587 ^A	104,461	5,592	2,140	1,204 ^E
90	90	Montana Power Co.	102,490	31,439	145,702	11,190	276,797	5,998	1,826	1,967

The P&GJ 500... dimensions of the pipeline energy business

Rank 83	84	Name Of Company	Number Of Customers	1983 Gas Sales, MMcf	1983 Oper. Revenues (\$'000)	1983 Net Income (\$'000)	Gas Plant Value (\$'000) 12-31-83	Additions To Plant (\$'000)	Miles Of Main	Miles Of Services
91	91	North Shore Gas Co.	97,756	33,512	154,784	6,412	110,762	245	1,660	1,520
93	92	Intermountain Gas Co. ¹	94,909	23,714	139,877	5,130	72,092	3,189	3,100	1,828
92	93	City Gas of Florida ¹	94,575	7,200	40,154	1,815	45,851	1,526	3,047	1,077
96	94	Colorado Springs DPU	93,817	18,339	94,406	1,405	33,195	6,052	1,354	496
94	95	Colonial Gas Co.	92,631	14,349	119,329	5,291	88,603	7,073	2,021	1,235
95	96	Orange & Rockland Utilities	91,490	22,538	526,045 ^A	36,102 ^A	71,825	458	1,477	1,257
97	97	Mobile Gas Service Co. ¹	87,427	128,732	78,783	1,792	34,416	2,599	1,265	1,623
99	98	North Carolina Natural Gas ¹	86,000	24,570	166,472	3,263	58,965	4,625	1,901	854
98	99	Gulf States Utilities Co.	85,190	9,513	47,102	-271	17,929	713	1,343	1,180
100	100	Cascade Natural Gas Corp.	83,643	34,268	184,842	2,403	109,569	10,459	2,857	1,407
101	101	Washington Water Power Co.	75,420	22,730	120,580	9,460	59,139	1,614	2,194	1,293
102	102	Delmarva Power & Light Co.	74,512	16,450	93,680	4,887	70,454	4,735	1,028	875
103	103	Arkansas Western Gas Co.	74,287	15,800	68,499	4,119	36,110	6,397	1,902	307
104	104	Richmond (Va.) City of ^F	71,090	12,916	83,363	1,517	40,377	4,784	1,005	1,100
105	105	Michigan Power Co.	70,466	20,611	105,024	1,269	46,497	1,609	1,547	1,122 ^E
106	106	Madison Gas & Electric Co.	70,162	15,434	214,103 ^A	18,805 ^A	66,736	4,224	1,263	988
108	107	TransLouisiana Gas Co. Inc.	69,969	7,761	50,385	2,605	42,357	5,478	1,840 ^E	678 ^E
110	108	Southeastern Michigan Gas Co.	67,073	13,685	81,474	3,153	55,680	2,570	1,330	755
114	109	Gasco Inc.	66,711	4,814	71,723	3,449	52,020	2,265	590	533
112	110	Greeley Gas Co.	66,225	13,766	63,792	N A	N A	N A	1,481	753
107	111	Nashville Gas Co. ^M	66,212	17,790	91,295	1,340	38,669	2,613	1,716	N A
111	112	Associated Natural Gas Co.	65,710	10,960	57,255	1,580	21,676	1,250	1,336	621
113	113	Northwestern Public Service Co.	64,751	13,364	58,332	9,463	29,942 ^B	737	1,076	1,072
109	114	Rio Grande Valley Gas Co.	64,261	5,778	37,831	1,828	37,450	5,750	1,754	226
116	115	North Central Public Service Co.	64,037	15,228	76,489	5,023 ^A	23,155	2,449	1,363	727
115	116	Southern Indiana Gas & Elect. Co.	63,858	18,144	276,727	27,105	23,164	2,563	1,107	731 ^E
117	117	Union Light, Heat & Power Co., The	60,554	11,294	70,899	5,030	37,096	3,175	729	153
146	118	Penn Fuel System, Inc.	60,326	32,734	161,816	3,236	70,682	3,007	2,477	969
118	119	Corpus Christi Gas Division	57,401	4,867	29,632	581	21,000	3,628	1,013	12
120	120	Sierra Pacific Power Co.	55,208	7,016	50,014	3,851	344,944	2,252	625	450
122	121	Springfield City Utilities	54,724	10,481	52,301	3,057	33,921	2,381	783	877
119	122	Union Gas System Inc.	54,396	12,604	45,603	609	11,255	1,036	2,810	572
121	123	Arkansas Oklahoma Corp.	53,957	12,084	31,470	1,332	36,821	4,047	589	403
123	124	CP National Corp.	53,646	7,565	53,439	2,747	33,975	2,973	1,346	N A
125	125	Enstar (Anchorage Natural Gas)	52,000	36,041	N A	N A	N A	N A	544	495
124	126	Missouri Utilities Co.	48,555	4,341	33,891	3,252	24,872	2,161	848	552
125	127	Central Hudson Gas & Elect. Corp.	47,187	9,837	61,649	35,329	58,322	3,228	708	456
126	128	Valley Resources Inc. ^H	46,795	6,207	47,831	1,451	21,251	572	489	336
127	129	Interstate Power Co.	45,023	25,808	97,241	-933	31,307	4,539	840	N A
128	130	Energy Services of Pensacola	43,660	4,192	29,550	4,997	14,068	N A	944	619
129	131	Florida Public Utilities Co.	41,419	6,759	31,767	1,592 ^A	16,184	1,774	604	N A
130	132	Fall River Gas Co.	41,337	5,829	40,725	1,573	15,669	854	443	347
131	133	Missouri Public Service Co.	39,799	7,781	44,205	23,604	29,832	1,761	864	497
133	134	Wisconsin Fuel & Light Co.	37,886	13,935	69,463	1,427	12,962	1,366	853	554
134	135	Wisconsin Southern Gas Co. Inc.	37,869	8,030	39,983	1,066	15,663	1,450	1,002	612
132	136	Iowa Southern Utilities Co.	37,763	8,243	43,638	206	13,618	630	662	558
175	137	EnergyNorth Inc. ^P	35,435	5,937	42,568	820	26,503	3,263	604	401
135	138	Missouri Power & Light	34,963	6,995	32,232	1,181	26,454	1,277	708	450
136	139	Terre Haute Gas Co.	33,172	15,293	60,226	N A	N A	N A	704	N A
137	140	Roanoke Gas Co. ¹	32,072	7,202	45,851	1,304	15,372	86	413	300

Cable TV and gas distribution have more in common than might be imagined. At Piedmont Natural Gas Co., they found that the expertise developed in underground gas main and service construction, along with the equipment and crews, can be used successfully in a cable television service distribution operation. So can skills in accounting, billing, collection, and marketing.

The Charlotte, N.C. gas utility added its cable TV operation in 1982 because the gas business had leveled off and the company had a surplus of crews, equipment, and ability. The plan worked. It was so successful that in 1983 Piedmont's new subsidiary expanded into cable TV and telephone cable design and construction. The PNG Communications Division also is involved in a joint venture firm that builds both aerial and underground cable systems. Recently it bid on a New England cable TV system and got the job.

Cable TV is only one of the many ways that Piedmont, under leadership of John Maxheim, president and CEO, has expanded its vistas. Recognizing that the firm had to get outside the slow-moving gas utility field, Maxheim turned company attention to non-utility activities that are energy related. These include sale of LP-gas and associated products, especially

ON THE FAST TRACK...

Piedmont Natural Gas: Profitable Alternatives

propane carburetion for vehicle fleets; residential and commercial gas appliances; solar energy systems; energy conservation products and services; and commercial coal and fuel oil. Most activities now are separate divisions.

Piedmont Natural simultaneously is aggressively selling and leasing appliances; working with *Popular Science* magazine in evaluating new gas furnaces and equipment for homes; adding new customers via comprehensive marketing programs; and, through PNG Energy Co., is acting as agent for several of its large industrial customers for purchase and transportation of gas at prices competitive with alternate fuels.

Piedmont now is ranked by *Financial World* as one of its top 13 blue chip stocks (only utility on the list). Moody's and Standard & Poor's both have raised the utility into the "A" range. Piedmont's fast track approach to "making hay" even when the sun isn't shining illustrates that alternatives can be profitable, and, if they are profitable, they can be fun.



Wate F. Schiefer, vice president - gas supply and transportation, and William L. Lindner, vice president - technology, check plans for Piedmont's innovative gas transportation program.

The P&GJ 500... dimensions of the pipeline energy business

Rank 83	Rank 84	Name Of Company	Number Of Customers	1983 Gas Sales, MMcf	1983 Oper Revenues \$(000)	1983 Net Income \$(000)	Gas Plant Value \$(000) 12-31-83	Additions To Plant \$(000)	Miles Of Main	Miles Of Services
138	141	Battle Creek Gas Co. ⁱ	31,284	10,133	53,095	1,816	33,496	1,571	518	360
139	142	SE Alabama Gas District	30,702	7,390	35,266	445	26,037	153	778	470
142	143	Essex County Gas Co. ^h	29,941	4,314	34,807	1,386	30,393	3,074	563	387
141	144	Chattanooga Gas Co.	28,599	14,583	76,157	1,547	40,103	1,497	826	404
144	145	Delta Natural Gas Co. ^j	28,574	4,930	27,493	1,011	20,134	2,540	792	263
143	146	Kokomo Gas & Fuel Co.	28,281	10,551	41,364	N A	N A	N A	544	444
147	147	Huntsville Util. Gas System	26,109	5,574	22,103	N A	N A	N A	535	399
145	148	Berkshire Gas Co. ^f	25,827	5,076	36,694	1,078	25,997	2,939	573	320
148	149	Ohio Gas Co.	25,166	6,705	31,322	1,862	27,627	2,212	504	410
149	150	Alexandria Gas Dept.	24,250	3,078	7,242	N A	N A	N A	57	229
151	151	Cheyenne Light Fuel & Power Co.	23,944	7,268	29,661	N A	8,245	782	418	N A
150	152	Ohio Valley Gas	23,898	6,837	28,369	N A	N A	N A	563	240
	153	Hoosier Gas Corp.	23,198	4,094	19,791	N A	N A	N A	406	750
153	154	Hamilton, City of	22,960	4,669	20,011	N A	N A	N A	211	219
152	155	Palo Alto, City of	22,932	3,412	16,506	234	3,939	304	205	215
156	156	Rocky Mountain Natural Gas	22,406	4,722	23,144	284	27,715	1,943	464	418
155	157	Great Falls Gas Co. ^f	22,094	4,536	22,110	574	8,056	326	354	420
158	158	Austell Natural Gas System	22,092	2,830	15,420	N A	15,670	540	497	443
154	159	Mesa, City of ⁿ	21,998	2,415	15,196	1,413	12,663	612	541	279
157	160	Duluth Dept. of Water & Gas, City of	21,069	4,443	24,816	875	24,284	1,746	419	250

ON THE FAST TRACK...

Transcontinental Gas Pipe Line: Opportunities In Transition

Some companies resist change, fearing the unknown dangers lying in wait for the unwary and the unconventional. Others see opportunities rather than risks, and welcome changes. A member of the latter category, Transcontinental Gas Pipeline Corp., through its industrial marketing and contract carriage programs, has become a trailblazer during a period of transition in the natural gas business.

Increased competition from fuel oil in the industrial marketplace was experienced across much of the U.S. in 1983. Nowhere was this more obvious than in Transco's market area, from south of Atlanta to north of New York City. Competition also came from other pipelines in the area.

To counteract declining gas sales, Transco implemented the Industrial Sales Program in May. Under this program, the first special marketing program approved by FERC, Transco acts as agents for its



W.J. "Jack" Bowen, left, chairman and CEO of Transco, and Brian E. O'Neill, right, president of Transcontinental Gas Pipe Line.

utility customers. The pipeline calculates a monthly spot market price for gas that is competitive with certain alternate fuels, and transports the gas to the city gate from the wellhead. The Contract Carriage Program was implemented in July to retain markets that the pipeline cannot serve under the ISP or other tariffs. In this program, Transco identifies specific gas supplies for direct purchase by its customers and then transports the gas to meet a particular local market demand.

The company transported approximately 59 Bcf under the two programs in 1983.

Transco has been able to keep down

prices with two programs initiated November 1. Under the Market Retention Program, the company offered to purchase approximately 400 MMcf/d at a posted price of \$3.10/MMBtu or less. This program provides the company's producers a chance to increase their sales above a production cutback level already established by Transco.

Also in November, Transco cut the price it was willing to pay for NGPA sections 102, 103, 107, and 108 gas to \$2.80/MMBtu. An incentive price of \$3.40/MMBtu is being offered to producers that waive certain take-or-pay claims.

The company spent \$147.3 million on pipeline capital expenditures in 1983 and expects to spend \$223 million on capital expenditures in 1984.

The P&GJ 500... dimensions of the pipeline energy business

Rank 83	Rank 84	Name Of Company	Number Of Customers	1983 Gas Sales, MMcf	1983 Oper. Revenues \$(000)	1983 Net Income \$(000)	Gas Plant Value \$(000) 12-31-83	Additions To Plant \$(000)	Miles Of Mains	Miles Of Services
159	161	Willmut Gas & Oil	20,296	3,274	16,013	N A	N A	N A	500	191
164	162	Knoxville Utilities Board	20,232	6,474	34,568	N A	N A	N A	672	405
162	163	Inter-City Gas Corp. Inc.	20,095	10,916	51,911	N A	N A	N A	417	333
160	164	Brazos River Gas Co.	20,056	2,880	12,854	150	4,377	366	521	37
161	165	Albany Water Gas & Light Comm ^F	20,000	4,400	19,000	2,000	18,000	100	335	600
168	166	Gulf Natural Gas Co.	19,145	3,500	N A	N A	N A	N A	465	182
165	167	Okaloosa County Gas District	18,879	2,367	15,220	500	12,981	N A	585	515
166	168	Northern Indiana Fuel & Light Co. Inc.	18,494	4,532	26,520	822	11,991	1,124	492	210
167	169	South Coast Gas Co. ^F	18,033	1,506	8,864	2,862	7,218	216	495	248
169	170	Kansas Public Service Co.	17,766	3,450	10,967	N A	N A	N A	258	174
171	171	Union Electric Co.	17,162	16,608	104,898	2,995	77,473	4,426	2,392	N A
170	172	Great River Co.	17,147	5,502	30,106	-78	9,849	384	444	167
172	173	Jackson Utility Division	16,247	5,313	25,290	518	9,032	697	391	288
173	174	National Gas & Oil Corp.	16,109	13,897	58,472	3,169	27,673	2,132	1,037	113
174	175	Citizens Utilities	15,880	2,514	15,452	N A	505,086 ^C	4,048	326	28
183	176	Gainesville Gas Co.	15,235	2,989	N A	N A	N A	N A	320	139 ^E
176	177	Northern Gas Co.	15,045	3,125	10,660	N A	N A	N A	274	142
177	178	Fitchburg Gas & Electric Light	15,023	2,179	48,877	3,288 ^A	12,330	734	294	170
179	179	Danville Gas Dept., City of ^F	14,950	5,005	22,928	1,042	5,355	414	248	178
178	180	Trussville Utilities Board	14,843	10,120	N A	10,169	19,864	N A	310	371

ON THE FAST TRACK...

Memphis Light, Gas and Water: Innovations, Marketing Pay Off

Memphis declares that the city no longer is "the best kept secret in America." It is also no secret that Memphis Light, Gas and Water Division is an active partner in promoting the city as a major distribution center (sixth in the U.S.).

An innovative and assertive organization, MLGW utilizes technical improvements, energy source innovations, and strong commercial and industrial marketing programs to add emphasis to its reliable gas service.

Marketing, under Ira Stanfill, vice president of marketing and energy systems, is concentrating on re-establishing liaison with its 120 largest commercial and industrial users (the million-dollar accounts), many of whom were found to be planning expansion but not planning to use gas because they were uncertain of its future. Marketing personnel now have weekly breakfast meetings, inviting one or two people from three or four companies, to discuss and solve problems, talk about the future, conduct question and answer sessions, and improve relationships.



New and innovative approaches to gas marketing are discussed by Memphis Light, Gas and Water's Ira C. Stanfill, left, vice president, marketing and energy systems; Paul Harris, manager, commercial and industrial marketing; and Larry Papasan, president of MLGW.

Seminars for fleet users of compressed natural gas (as a vehicle fuel) have been exceptionally successful.

Newest marketing project is involvement in special programs whereby MLGW will act as a broker for industrial customers and arrange purchase and transportation for those customers.

A unique "pressure reduction system" — utilizing turbines powered by the pressure drop available in gas at city gate stations where pressure is reduced from pipeline to street main pressures — is now

operating. The turbine powers a generator that delivers 3 million kwh annually to the electric distribution system. Recovery of landfill gas is another energy project under development.

Most unique project is ownership and operation of a 14-mile crude oil pipeline from nearby Capline to a refinery owned by MAPCO, on the Mississippi River, and an 8-mile products line from the refinery to the Memphis airport. The lines transport crude and products for a fee.

Technical improvements include work on a computerized dispatching system; an upgraded computerized accounting system; improved internal management information system, and continuing research into improved operations.

The P&GJ 500... dimensions of the pipeline energy business

Rank 83	Rank 84	Name Of Company	Number Of Customers	1983 Gas Sales, MMcf	1983 Oper. Revenues \$(000)	1983 Net Income \$(000)	Gas Plant Value \$(000) 12-31-83	Additions To Plant \$(000)	Miles Of Mains	Miles Of Services
180	181	Pennsylvania & Southern Gas	14,800	5,237	28,831	N A	14,676	N A	463	207
182	182	Las Cruces Gas System	14,745	1,520	7,000	N A	N A	N A	350	167
186	183	Tennessee-Virginia Energy ^G	14,420	8,715	46,471	919	21,982	1,856	592	133
181	184	Chesapeake Utilities Corp.	14,346	1,980	11,746	N A	10,489	N A	312	168
187	185	Great Plains Natural Gas	14,016	3,032	17,503	426	6,698	368	318	224
185	186	Houma Municipal Gas System	14,013	3,846	N A	N A	N A	N A	156	132
184	187	Moran Utilities	13,851	1,473	10,691	N A	N A	N A	290	100
188	188	Richmond Gas Corp.	13,710	3,636	15,102	N A	N A	N A	214	158
189	189	Vermont Gas Systems	12,694	4,367	27,516	N A	11,481	N A	256	154
190	190	Lancaster Municipal Gas Co.	12,658	1,945	10,024	N A	N A	N A	281	111
194	191	Ft. Hill Natural Gas Authority ^J	12,440	3,307	16,577	N A	N A	N A	354	354
192	192	Charlottesville Gas Division	12,293	1,925	13,186	N A	N A	N A	199	171
195	193	Hobbs Gas Co.	12,203	1,676	8,179	N A	N A	N A	266	135 ^F
191	194	Warner Robbins Gas, City of ^K	12,100	3,571	16,125	617	5,343	46	195	115
196	195	Holyoke Gas & Electric	12,000	1,839	12,514	N A	N A	N A	127	71
193	196	Corning Natural Gas Corp.	11,876	12,471	60,949	523	8,384	260	102	237
198	197	Middle Tennessee Gas Util. Dist.	11,184	2,590	12,600	N A	N A	N A	615	349
197	198	Dalton Utilities	11,000	9,617	N A	N A	N A	N A	40	104
	199	Clearwater, City of ^I	10,424	1,225	7,694	338	4,405	N A	325	118
201	200	Midwest Energy Inc.	10,291	1,967	7,589	1,025	2,519	139	225	126